01504

1992/02/10

~~Secret~~

~~NOFORN~~
~~WNINTEL~~

NAIC

UNCLASSIFIED

Technological Base Resources—China: An Overview of the Military Products Research & Development System

A Defense S&T Intelligence Study

Defense Intelligence Agency

Department of the Air Force

97-082

UNCLASSIFIED

DST-1830S-407-92
10 February 1992

~~Secret~~

~~SECRET~~ UNCLASSIFIED

TECHNOLOGICAL BASE RESOURCES—CHINA: AN OVERVIEW OF THE MILITARY PRODUCTS RESEARCH & DEVELOPMENT SYSTEM

Author: [redacted] EXP 6G

DST-1830S-407-92

DIA TASK NO. PT-1830-01-04L

DATE OF PUBLICATION
10 FEBRUARY 1992

Information Cutoff Date
10 February 1992

This is a Department of Defense Intelligence Document prepared by the Foreign Aerospace Science and Technology Center, Air Force Intelligence Command, under the DoD S&T intelligence production program and approved by the Assistant Chief of Staff for Intelligence, US Air Force.

This document has been processed for CIRC

~~NOT RELEASABLE TO FOREIGN NATIONALS~~

~~WARNING NOTICE—INTELLIGENCE SOURCES OR METHODS INVOLVED~~

Classified By: Multiple Sources
DECL: OADR

UNCLASSIFIED

~~SECRET~~
(Reverse Blank)

PREFACE

[redacted]

(U) This document was prepared in response to DIA Task PT-1830-01-04L "Technological Base Management-China." Contributions to this document were provided by [redacted] DIA-DT-1B and [redacted], FSTC, and [redacted], FASTC-TANM.

(U) Comments are invited and should be forwarded to the Defense Intelligence Agency (ATTN:DIA/DT-3), Washington, D.C. 20301.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Exp. b1

SUMMARY

(S) [redacted]

(S) [redacted]

(S) [redacted]

(S) [redacted]

(S) [redacted]

Exp. b1

SECTION I

INTRODUCTION (U)

(U) The Chinese have embarked upon their eighth five-year plan (1991-1995) in the wake of the massacre of students at Tiananmen Square in June, 1989, and the destruction of Iraq's armed force in Operation Desert Storm. Both of these events have had an effect on the aging Chinese leadership which has, on the one hand, revealed the need for the party to control the gun, and, on the other hand, has shown the barrel of the gun to be somewhat rusty vis-a-vis the high technology world of Desert Storm. Both the Tiananmen massacre and Desert Storm will impact upon how many, and what kinds of weapons, the forces of the People's Liberation Army (PLA) will acquire in the coming decade.

~~(FOUO)~~ China is continuing its Four Modernizations Program intended to double China's 1980 gross national product by the end of the century. The order of this modernization effort has been, until this year, industry, agriculture, science and technology, and defense. In the wake of the Gulf War, Premier Li Peng has reordered the Four Modernizations and put science and technology first. In addition, a new emphasis is being placed upon the importance between high technology and the modernization of national defense. However, this change in priorities is not without its critics and another ranking may yet occur.

~~(S)~~ [redacted]

~~(C-NOFORN)~~ [redacted]

[redacted]

~~(S)~~ [redacted]

~~(C)~~ [redacted]

EXP b1

SECTION II

THE CHINESE MILITARY PRODUCT R&D STRUCTURE, PHILOSOPHY AND CAPABILITY (U)

ORGANIZATION STRUCTURE (U)

~~(S NOFORN)~~ [redacted]

~~(S NOFORN)~~ [redacted]

(U) Military product R&D is conducted across a broad spectrum of organizations in China, though generally placed into two sectors - military and civilian. In the military sector, defense-related R&D is conducted in research facilities of the PLA, research academies directly controlled by COSTIND and in research academies of the defense industrial ministries. With the streamlining of the government bureaucracy in 1988, it has become more difficult to distinguish between civilian and defense ministries. The diversification or conversion of much idle defense plant space to the production of civilian goods has blurred what was once a fairly distinct separation.

(U) The specific processes through which the leadership acquires the technical advice and recommendations needed to make informed decisions has never been well documented. Some formal mechanisms for the upward flow of technical proposals through bureaucratic channels are known to exist and are assumed to operate. However, these mechanisms generally are part of the conventional planning process. They involve the submission of plans and proposals developed in research institutions for approval at various higher levels, usually up to the level of parent ministry leadership. This process has functioned in response to policy guidelines formulated by the leadership and passed down through the system. Although the process to some extent is an iterative, interactive cycle, it certainly is not the complete explanation of how major R&D policy initiatives are formulated at the highest level.

(U) The Chinese military product R&D is also characterized by informal interaction among a small number of key scientists that simultaneously hold official positions in several organizations. They interact as members of professional societies, at national planning conferences and as advisors to political personalities. An example of such a key scientist is Qian Xuesen. Qian is currently a member of the Chinese Academy of Sciences (CAS), President of the China Association for Science and Technology, a Vice-Chairman of the Seventh China People's Political Consultative Conference, director of a major CAS institute in Beijing and an alternate member of the Eleventh Chinese Communist Central Committee. Because of Qian's activities in the PRC space effort, he is commonly referred to as "The father of the Chinese space program."

CHINESE RESEARCH AND DEVELOPMENT PHILOSOPHY (U)

(U) Greater emphasis in the Chinese R&D system has historically been placed on applied research over basic research for immediate, tangible results; that which can make an immediate improvement for the people. This is not to say that the Chinese are incapable of theoretical pursuits or that there are no capable Chinese theoreticians, quite the contrary. In the current S&T modernization program, applied research efforts are again being promoted to raise the overall level of S&T, upgrade the quality of Chinese products, and increase the volume and competitiveness of their products for export.

~~(S)~~ [redacted]

CHINESE R&D MANAGEMENT PHILOSOPHY (U)

~~(S)~~ [redacted]

(U) In China, the decision-makin[illegible] usually takes place in a 'committee' setting, to [illegible] the collective responsibility of all the participants. Chinese managers and scientists are not fond of 'sticking their necks out'. This is not because of a lack of technical confidence but because any decision they make today may not be politically correct at some time in the future.

(U) Press releases to the contrary, there is only a minimal amount of competition in the Chinese weapons R&D system. There are two main reasons for this. First, individual researchers and institutes are generally dedicated to specific military products. And second, China's scientific and technical manpower resources are very limited and spread very thin. In some cases, there may not be a competitor available - especially for some subsystems.

CHINESE R&D SYSTEM STRENGTHS (U)

A. MOBILIZATION OF MANPOWER (U)

~~(S)~~ [redacted]

B. ENGINEERING PROBLEM-SOLVING EXPERIENCE (U)

~~(S)~~ [redacted]

[redacted]

CHINESE R&D SYSTEM WEAKNESSES (U)

A. SHORTAGE OF QUALIFIED S&T MANPOWER (U)

(U) Since its founding in 1949, the People's Republic of China has been seriously affected by a shortage of professional scientists and engineers. Efforts to modernize the economy and the military have always been hampered by a generally low level of science and technology. Deficiencies have been the result, in large part, of an S&T manpower pool of insufficient size and of a caliber generally below that of advanced nations. For the past 30 years, there have been periodic attempts to enlarge and upgrade the S&T work force, but plans were often thwarted by political events.

(U) From the beginning, Chinese leaders were aware of the problem of insufficient numbers of scientists and engineers as evidenced by a call that went out in 1950 for ethnic Chinese scientists living abroad to return to China and assist in its modernization efforts. Many did return during the following decade, and coupled with those receiving advanced education in the Soviet Union prior to 1962, formed the back-bone of the S&T work force. That group numbered about 10,000, of which 1,100 received Doctoral level degrees in the West and less than 2,000 received similar degrees in the USSR. The current cadre of senior researchers and other leaders of the scientific community come from this group.

(U) The shortage of qualified R&D personnel in China is compensated for by having the older cadres assigned multiple research responsibilities. Each of these scientists have worked simultaneously on several priority research projects at institutes of the Academy of Sciences, industrial ministries, and technical colleges and universities. The competent individuals were brought together to work in research task forces that cut across administrative lines of organization. The task group approach is widely used in high-priority military product R&D programs.

~~(C)~~ [redacted]

~~(C)~~ [redacted]

~~(S NOFORN)~~ [redacted]

~~(C)~~ [redacted]

(U) China has set ambitious goals in its race to catch up with the modernized world. To achieve such ambitious goals, the S&T manpower situation must improve dramatically. Goal achievement is dependent upon the ability to revitalize education and equip universities with modern textbooks and equipment. Further, the ability and willingness of foreign countries to absorb large numbers of Chinese students in their educational systems, the ability of these students to absorb the required knowledge, and the ability of the Chinese government to finance its modernization programs are all factors that must be considered in projecting future manpower strength and capability.

(U) The future S&T manpower situation in China is uncertain. While there appears to be consensus among the top political leadership as to goals, it is not certain how the consensus on, or continuity of, programs might be affected by the death of someone such as Deng Xiaoping. Of even less certainty is the degree of consensus and willingness to cooperate among those who must be depended upon to implement the plans. There are noticeable pockets of resistance in both scientific and education circles, as older cadres are forced to make room for younger, more technically competent scientists and administrators. Another uncertainty is whether China's modernization plans are simply too ambitious. The leadership may have overestimated it's ability to achieve its goals. For a more detailed analysis of Chinese S&T manpower, see "S&T Manpower(Trends and Forecasts) - China", DST-1830S-269-88.

B. POOR LATERAL COMMUNICATIONS (U)

[redacted]

EXP b1

C. POOR MANAGEMENT WORK STYLE (U)

(U) Management is considered by the Chinese to be one of the four 'bottlenecks' in the successful achievement of their modernization goals. The other bottlenecks are considered to be energy, transportation and telecommunications. In general, the Chinese are having a very difficult time converting from a socialist management style to one more compatible with their goal of achieving a more market-oriented economy with Chinese characteristics. Specifically, the Chinese are having trouble marketing their products, becoming more results oriented, and adopting an aggressive management style. The Chinese are very uncomfortable moving from committee decision-making with inflexible, entrenched bureaucrats to an independent manager concept. However, they are attempting to introduce some western style management techniques in their aerospace sector.

EXP b1

SECTION III

COMMISSION FOR SCIENCE, TECHNOLOGY, AND INDUSTRY FOR NATIONAL DEFENSE (U)

~~(S)~~ [redacted]

~~(C NOFORN)~~ [redacted]

~~(S NOFORN WNINTEL)~~ [redacted]

o (U) Overall program planning and coordination.

o (U) Project assignment and funding.

o (U) Performance of limited basic and applied research, component design and fabrication.

o (U) Coordination of end-item assembly and testing.

[redacted]

~~(S)~~ [redacted]

~~(S)~~ [redacted]

COSTIND PERSONNEL (U)

~~(C NOFORN)~~ [redacted]

[redacted]

EXP b1

COSTIND FACILITIES (U)

~~(S-NOFORN-WNINTEL)~~ [redacted]

SECTION IV

CHINESE WEAPONS ACQUISITION PROCESS (U)

~~(S)~~ [redacted]

~~(S)~~ [redacted]

1. THEORETICAL EVALUATION (U)

~~(S-NOFORN)~~ [redacted]

[redacted]

2. PROGRAM PHASE (U)

~~(S-NOFORN)~~ [redacted]

[redacted]

3. ENGINEERING DEVELOPMENT (U)

~~(S)~~ [redacted]

3.a. Prototype Development (U)

~~(S NOFORN)~~ [redacted]

3.a.(1). General Layout (Preliminary Design) (U)

~~(S NOFORN WNINTEL)~~ [redacted] ~~(S NOFORN WNINTEL)~~ [redacted]

[redacted] ~~(S NOFORN WNINTEL)~~ [redacted]

3.a.(2). Technical Design (U)

[redacted]

EXP b1

components for which long term research has begun. When all this is accomplished, the proposed design and a technology appraisal report is prepared and submitted to COSTIND for approval with copies probably also going to MASI and GSD. If approved, signifying that the submitted design meets the original requirements, the design requirement is frozen and no major changes are allowed thereafter, e.g., the wing or the tail cannot be moved.

3.a.(3). Prototype Development (On-site Design) (U)

If the Design Institute organization lacks CAD capability, then blueprints must be drawn by hand and, for a new aircraft, may take as much as ten months. Factory tooling begins; final weight analysis is conducted; and, very specialized wind tunnel testing continues (i.e., take-off and landing configurations). At this stage, the flight test program formulation begins and the performance is recalculated. After all these final calculations, the design is frozen. From this point forward, the design can only be changed for reasons of safety. In some cases discrepancies are handled by rewriting the flight manual and placing limitations on how the aircraft is flown. A report is written on the finished design and submitted to COSTIND and the GSD.

3.b. Prototype Production (U)

This stage requires extensive subcontractor involvement. At least two prototypes will be built; however, newer programs with high funding have built as many as six prototypes. The second prototype on all known programs has been a static test aircraft. Other prototypes are used for engine testing, stability/flutter testing, aerodynamic load testing, and avionics/weapons integration testing. By the end of this phase, the chief engineer has approved the flight test program and the process moves on to the next phase. During this stage ejection seat testing on rocket sleds also takes place.

3.c. Test and Evaluation (U)

Flight testing is generally conducted both at the factory and at the China Flight Test Center (formerly 630 Research Institute) at Xian. China's aircraft factories have been attempting to become more independent by conducting more of the flight testing at their facilities. Testing usually begins within 30-60 days after rollout of the first prototype. If the airframe manufacturer/design institute is capable of performing static testing, then testing will begin immediately upon completion of the production of the second prototype. If testing cannot be done locally, the aircraft is shipped to the 623 Institute at Yaoxian (Shaanxi Province) for static testing. Initial flight tests consist of shaking down the major subsystems as well as basic aerodynamics and stability and control analysis. Envelope expansion is not conducted until the static tests are completed, which generally last six months. Initial weapons testing which consists of aerodynamic loads and stability and control is conducted. Near the end of this initial flight test program, activity consists of avionics development flight, actual weapons launch, and flutter testing. When flight testing is completed, a flight test report is written and the program transitions into the design finalization stage. At this point the prototype is frozen.

4. FINALIZATION (U)

(Ø) [redacted]

(Ø) [redacted]

4.a. DESIGN FINALIZATION (U)

(Ø) [redacted]

[redacted]

EXP b1

b. PRODUCT FINALIZATION (U)

[redacted]

EXP b1

SECTION V

CHINESE ACADEMY OF SCIENCES (U)

~~(C)~~ [redacted]

~~(S-NOFORN-WNINTEL)~~ [redacted]

~~(C)~~ [redacted]

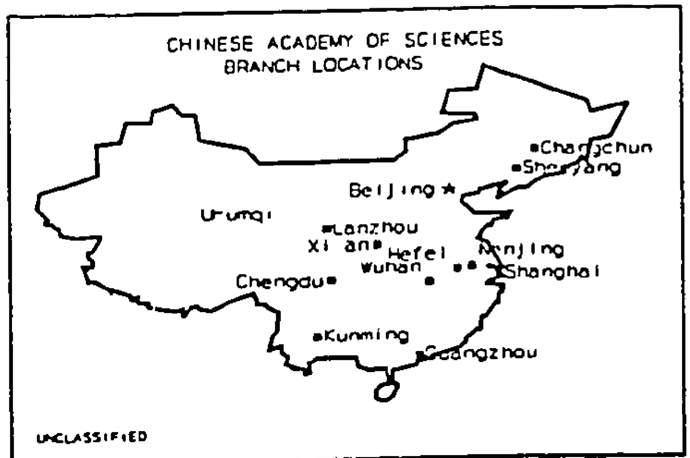


Figure 1 Branch Locations, Chinese Academy of Sciences (U)

[redacted]

~~(C)~~ [redacted]

~~(C)~~ [redacted]

Chinese Academy of Sciences

Presidium

Zhou Guangzhou
President
Theoretical Physicist

- Sun Honglie
  Vice-President
  Soil Science
- Wang Fosong
  Vice-President
  Polymer Chemist
- Hu Qiheng
  Vice-President
  Pattern Recognition
- Li Zhensheng
  Vice-President
  Wheat Breeder

Unclassified

Figure 2 Officials, CAS (U)

[redacted]

Exp b1

Ex P
b1

SECTION VI

CHINA NATIONAL NUCLEAR CORPORATION
MILITARY NUCLEAR RESEARCH AND DEVELOPMENT (U)

~~(S-NOFORN-WNINTEL)~~ [redacted]

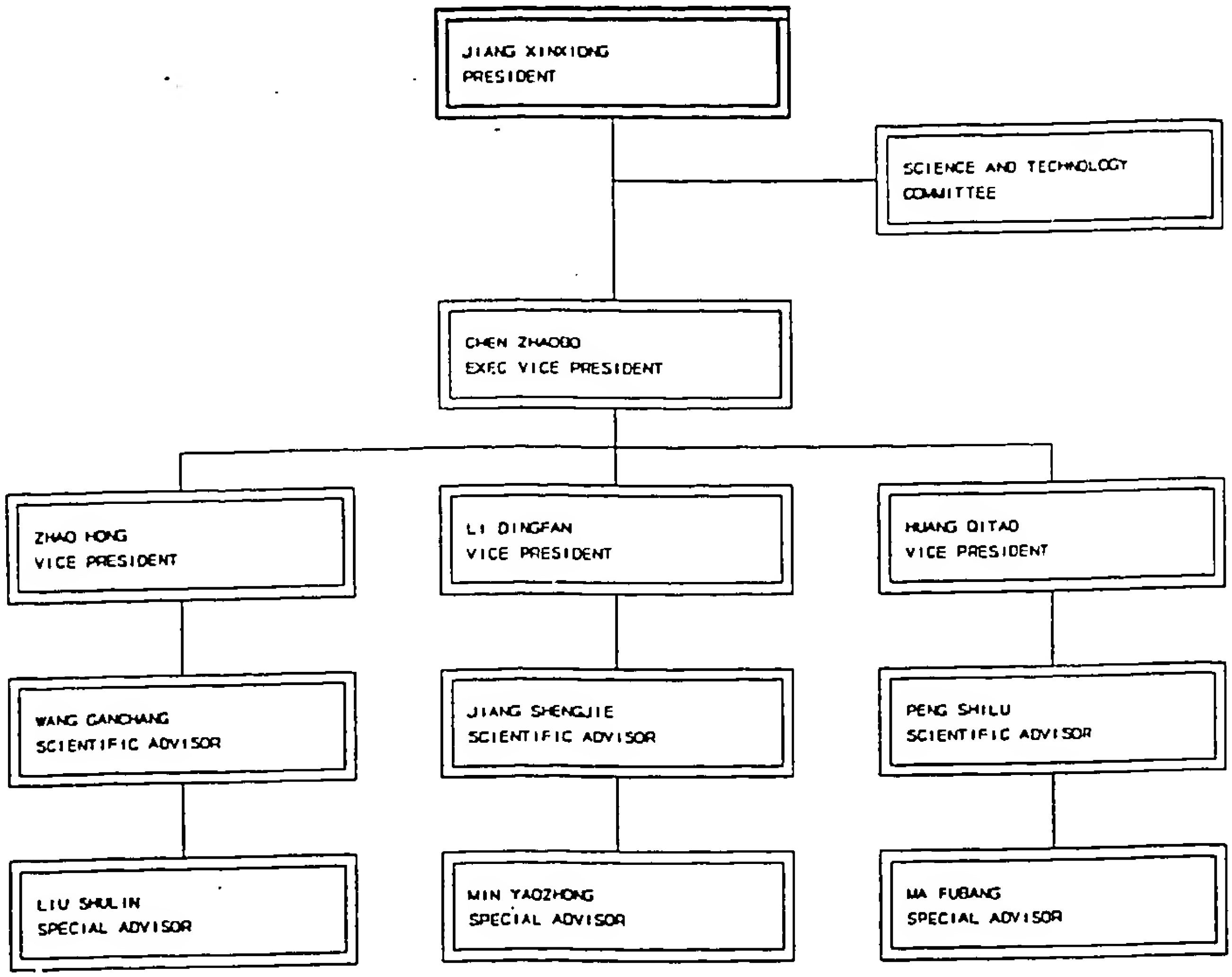
~~(S-NOFORN-WNINTEL)~~ [redacted]

~~(S-NOFORN-WNINTEL)~~ [redacted]

(U) The CNNC has the following responsibilities (as expressed by the Chinese): (1) accelerate nuclear power plant construction and conversion of the nuclear industry from military to civilian use; (2) production and operations related to the nuclear industry and part of the government management work of the Ministry of Energy's Resources; (3) basic and applied R&D related to nuclear technology, nuclear energy, and other high technology; (4) production of nuclear fuels, uranium products, radioactive isotope products and nuclear instruments, as well as disposal of nuclear waste and application of nuclear radiation technology; (5) foreign economic and technical cooperation, import and export of nuclear energy equipment, technology and labor service; and (6) R&D and production of military products. CNNC employs approximately 300,000 persons. Included in this figure are the scientists, engineers, technicians, and support personnel who work at various unidentified nuclear related research and development and production facilities throughout china.

~~(S-NOFORN-WNINTEL)~~ [redacted]

~~(S-NOFORN-WNINTEL)~~ [redacted]



UNCLASSIFIED

Figure 3 Key Personnel of CNNC (U)

EXP b1

<u>uclear Weapons Research, Development, and Testing (U)</u>

BUREAUS OF CNNC

- FINANCE
- PERSONNEL
- EDUCATION AND TRAINING
- LABOR AND WAGE
- FOREIGN AFFAIRS
- SCIENCE AND TECHNOLOGY
- PROJECT AND PLANNING
- ENTERPRISE MANAGEMENT
- DIVERSIFIED ECONOMY
- GEOLOGY
- URANIUM MINING AND METALLURGY
- NUCLEAR FUEL
- NUCLEAR POWER
- CONSTRUCTION AND INSTALLATION
- SAFETY, PROTECTION, ENVIRONMENT AND HEALTH

Figure 4 Bureaus of CNNC (U)

~~(S NOFORN WNINTEL)~~

[redacted]

~~(S NOFORN WNINTEL)~~

[redacted]

[redacted]

~~(S NOFORN WNINTEL)~~

[redacted]

Acquisition of Foreign Technology and Effects of Reforms (U)

~~(S NOFORN WNINTEL)~~

[redacted]

~~(S NOFORN WNINTEL)~~

[redacted]

~~(S NOFORN WNINTEL)~~

[redacted]

Ex b1

UNCLASSIFIED

EXP b1

SECTION VII

CHINA STATE SHIPBUILDING CORPORATION (U)

~~(C-NOFORN)~~ [redacted]

~~(S)~~ [redacted]

~~(C-NOFORN)~~ [redacted]

~~(S)~~ [redacted]

RESEARCH AND DEVELOPMENT ELEMENTS (U)

~~(S)~~ [redacted]

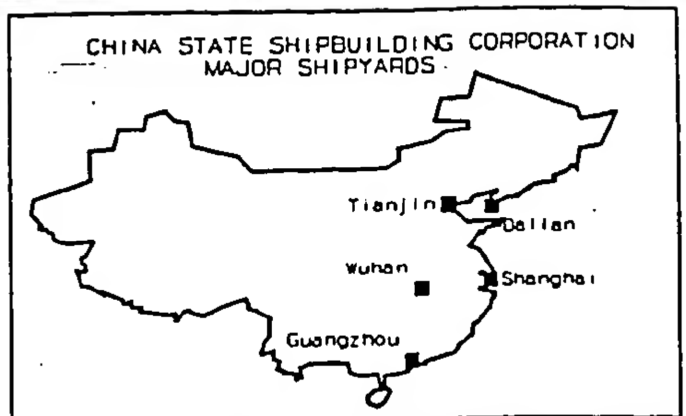


Figure 5 Major Shipyards, CSSC (U)

~~(S-WNINTEL-NOFORN)~~ [redacted]

~~(S-WNINTEL-NOFORN)~~ [redacted]

~~(S)~~ [redacted]

ExP61

UNCLASSIFIED

SECTION VIII EXP b1

Ministry of Machine Building and Electronics Industry (U)

(U) The Ministry of Machine Building and Electronics Industry (MMBEI) was formed in April 1988 by the merger of the State Machine Building Industry Commission (SMBIC) and the Ministry of Electronics Industry (MEI). The SMBIC itself was a new organization created in November 1986 by merging the Ministry of the Machine Building Industry (MMBI) and the Ministry of Ordnance Industry (MOI).

~~(S-NOFORN-WNINTEL)~~ [redacted]

~~(S-NOFORN-WNINTEL)~~ [redacted]

~~(S-NOFORN-WNINTEL)~~ [redacted]

~~(S-NOFORN-WNINTEL)~~ [redacted]

[redacted]

(U) Despite these spinoffs, MMBEI remains. The ministry is organized into a number of departments which administer functional production areas: Microelectronics and Primary Products, Computers, Telecommunication Products, Instrument and Meters, Basic Machine Products, Machine Tools, Engineering and Farm Machinery, and the First, Second, and Third Departments. In addition to these departments there is also a Military Products Department which is charged with developing, implementing and coordinating the annual production plans for the manufacture of military machinery and electronic products. This department also examines and approves standards for military products. Most probably it is the Military Products Department of the MMBEI which coordinates with COSTIND regarding defense industry production.

1. Research and Development Elements (U)

~~(S)~~ [redacted]

Ex P61

SECTION IX

Ministry of Aerospace Industry (MASI)

~~(C/NOFORN)~~ [redacted]

~~(S/NOFORN)~~ [redacted]

[redacted]

~~(C/NOFORN)~~ [redacted]

~~(C/NOFORN)~~ [redacted]

[redacted]

~~S/NF/WN~~

[redacted]

~~C/NOFORN~~

[redacted]

~~(C/NOFORN)~~

[redacted]

[redacted]

(U) For this study, the aviation and missile/space segments of MASI will be kept separate for ease of understanding.

1. Aviation Segment of MASI (U)

~~(C)~~ [redacted]

1.a. GENERAL (U)

(U) The Aviation Industry is characterized by three factors: geographic distribution of facilities, collocation of major R&D and production elements, and functional divisions among production elements. (Figure 6) The geographical distribution of the known production aviation facilities initially resulted from historical patterns of industrialization, and later from strategic planning for the development of defense facilities in the interior of China. Aircraft production facilities were developed first in the northeast, next in central China and more recently in the south. In spite of the construction of additional airframe, engine and component facilities in the south, major jet aircraft research activity has remained in the northeast, particularly in Shenyang.

~~(S/NF/WN)~~ [redacted]

~~(S/NF/WN)~~ [redacted]

[redacted]

1.b. DESIGN AND DEVELOPMENT ELEMENTS (U)

~~(S/NF/WN)~~ [redacted]

~~(C-NOFORN)~~ [redacted]

~~(S/NF/WN)~~ [redacted]

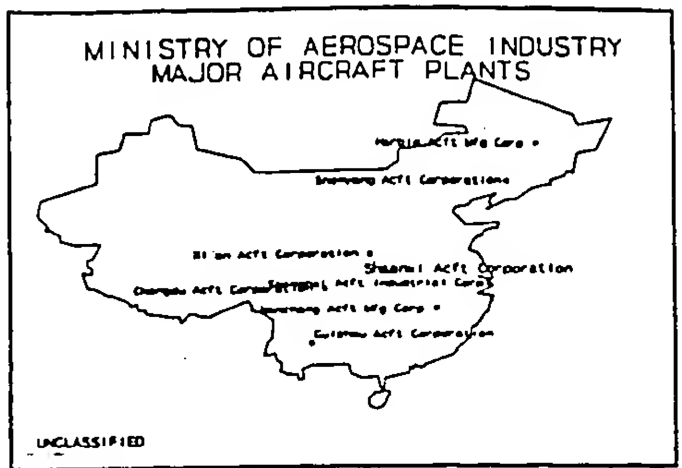


Figure 6 Major Aircraft Plants (U)

~~(S-NOFORN-WNINTEL)~~ [redacted]

~~(S)~~ [redacted]

~~(C-NF-WN)~~ [redacted]

1.c. TEST FACILITY SUPPORT TO AIRCRAFT DESIGN AND DEVELOPMENT (U)

~~(C)~~ [redacted]

~~(S)~~ [redacted]

[redacted]

~~NOFORN WNINTEL)~~

[redacted]

~~NOFORN)~~

[redacted]

~~WNINTEL)~~

[redacted]

J) For detailed information on China's overall aviation .D&T facilities, refer to DST-1830S-138-89.

2. Missile & Space Segment of MASI (U)

~~(C)~~ [redacted]

~~(S/NF/WN)~~ [redacted]

2.a. RESEARCH AND DEVELOPMENT ELEMENTS (U)

~~(S/NF/WN)~~ [redacted]

2.b. FIRST RESEARCH ACADEMY (U)

~~(S/NF/WN)~~ [redacted]

[redacted]

~~(S/NF/WN)~~ [redacted]

~~(S NOFORN WNINTEL)~~ [redacted]

~~(S)~~ [redacted]

~~(S)~~ [redacted]

[redacted]

2.c. SECOND RESEARCH ACADEMY (U)

~~(S)~~ [redacted]

~~(S)~~ [redacted]

2.d. THIRD RESEARCH ACADEMY (U)

~~(S/NF/WN)~~ [redacted]

2.e. FOURTH RESEARCH ACADEMY (U)

~~(S/NF/WN)~~ [redacted]

[redacted]

f. FIFTH RESEARCH ACADEMY (U)

~~(S/NF/WN)~~ [redacted]

~~(S/NF/WN)~~ [redacted]

~~(S)~~ [redacted]

~~(S/NF/WN)~~ [redacted]

~~(S)~~ [redacted]

[redacted]

2.g. SHANGHAI BUREAU OF ASTRONAUTICS

~~(S NOFORN WN~~[redacted]) [redacted]

Exp b1

SECTION X

TRENDS AND PROJECTIONS (U)

~~(C)~~ [redacted]

~~(C)~~ [redacted]

~~(C)~~ [redacted]

~~(C)~~ [redacted]

~~(C)~~ [redacted]

[redacted]

~~(S)~~ [redacted]

~~(C)~~ [redacted]

~~(S-NOFORN-WNINTEL)~~ [redacted]

[redacted]

EXP 61